meaningful participation in PCS for many rural telephone companies.[190] Similarly, Intelco contends that rural telephone companies should not be prohibited from bringing PCS to less populated areas simply because they previously invested in cellular licenses serving such areas.[191] USTA argues that all cellular eligibility limits should be eliminated on the grounds that such limits will restrict the full participation of small and mid-sized cellular providers, who are more likely to bring full PCS service to under-served areas.[192]

124. Most commenting parties generally favor exemptions for rural telephone companies and consortia led by designated entities. For example, CUC argues that rural telephone companies are most likely to deploy PCS in rural and remote areas and therefore should be encouraged to do so.[193] RCA contends that the cellular interests of rural telephone companies cannot exercise market power.[194] NRTA states that the Congress intended to ensure that new technologies are available to the residents of less populated areas, and that applying the cellular eligibility restrictions to rural telephone companies that hold significant but non-controlling interests in cellular licenses is incompatible with the intent of Congress.[195]

125. Decision. We agree with INS, OPASTCO, TDS and Intelco that relaxing the cellular eligibility restrictions is appropriate for designated entities.[196] We recognize that many designated entities are merely passive investors in cellular operators and, because of their size, are unlikely to influence pricing decisions, In addition, we seek to address Congress' goal of encouraging the participation of designated entities in the auction process and in the provision of spectrum-based services. We believe that designated entities which have some interests in cellular operations may be especially effective PCS competitors because of their cellular experience. This will help ensure that service is brought quickly to underserved areas and that designated entities become viable competitors. In particular, we believe that rural telephone companies and some small cellular companies, due to their existing infrastructure, are uniquely positioned rapidly to introduce PCS services into their service areas or adjacent areas. However, we are not exempting designated entities entirely

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[190] See OPASTCO Petition at 1-8.

[191] See Intelco Petition at 4-8.

[192] See USTA Comments at 5.

[193] See CUC Comments at 3.

[194] See RCA Reply at l-2.

[195] See NRTA Reply at 1-5.

[196] The Commission will provide further guidance as to what constitutes a small business, rural telephone company and a business owned by a member of a minority group or a woman for purposes of 47 U.S.C. § 309(j)in a forthcoming order in PP Docket No. 93-253.

from the cellular eligibility rules, because such an exemption could foreclose from competition from a new PCS entrant. To the extent that designated entities are involved in the control of cellular services, we remain concerned that there is potential for some of these parties to compete less vigorously in the nascent PCS industry. In balancing these interests, we conclude that increasing the cellular attribution threshold for designated entities from 20 percent to 40 percent, if non-controlling, would be appropriate and would further the Congressional mandate noted above. Accordingly, we will permit a designated entity to hold a non-controlling equity interest of up to 40 percent in a cellular licensee without being subject to the cellular PCS eligibility restrictions.

126. AIDE and Comcast support exempting from the PCS eligibility restrictions those cellular entities with minority interests in consortia controlled by designated entities. AIDE states that such an exemption would serve the Congressional intent that designated entities have opportunities to participate in PCS.[197] Murray supports the recommendation of the FCC's Small Business Advisory Committee that only parties that form alliances with designated entities be exempt from eligibility restrictions.[198] Cablevision, on the other hand, opposes an exemption for cellular parties that participate with designated entities in PCS. Cablevision argues that the potential for the cellular provider to exercise undue influence over the PCS licensee is too great to be ignored given the superior knowledge and experience of the cellular provider.[199]

127. We have decided to increase the cellular attribution threshold from 20 percent to 40 percent for any entity proposing to invest in businesses controlled by members of minority groups and/or women. An entity may hold up to a 40 percent interest in cellular licensees before its cellular interests will be deemed attributable, but must limit its participation in a PCS licensee controlled by women or minority group members to a non-controlling interest. We believe that this action will encourage entities with attributable cellular interests to make non-controlling investments in businesses owned by minorities and/or women, furthering Congress' objective of ensuring the participation of these entities in the competitive bidding process by encouraging an alternative source of financing. The record indicates that the main challenge that minorities and women face when seeking to participate in telecommunications licensing is ready access to capital.[200] Investments by cellular providers in these designated

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[197] See AIDE Comments at 7-9; see also Comcast Petition at 18-19.

[198] See Murray Comments at 7-8.

[199] See Cablevision Comments at 5.

[200] See, e.g., Report of the FCC Small Business Advisory Committee to the Federal Communications Commission Regarding GEN Docket 90-314, 8 FCC Rcd 7826-28 (1993); Second Report and Order, PP Docket No. 93-253, FCC 94-61, released April 20, 1994.

entities should increase the entities chances for success in the auctions and later in service competition by providing access to capital and valuable industry experience.

128. We are not, as requested by Comcast and AIDE, granting a blanket exemption to in-region cellular parties with 40 percent or greater equity or control to participate in consortia that include designated entities. Such an exemption would allow a cellular entity to control a cellular license and create the potential for the entity to influence the PCS licensee to compete less vigorously. As Cablevision observes, the potential for a cellular entity to exercise undue influence over the PCS licensee, especially absent limits on the control exercised by the cellular carrier over the designated entity and its own cellular license, is too great, given the superior knowledge and experience of cellular providers.[201] Therefore, we have relaxed the cellular attribution standard to permit entities that hold up to 40 percent non-controlling equity in cellular licensees in the same service area to make mm-controlling investments in PCS licensees controlled by woman- or minority-owned businesses. Because their investment will be non-controlling in both the PCS and cellular license, the threat to competition is diminished. We believe that this relaxed standard encourages availability of capital to PCS businesses owned by women and minorities, yet guards against the dominance of these designated entities by entities which also control a cellular license in the same service area.

129. Comcast requests that the Commission exempt non-wireline cellular carriers from the cellular eligibility rules. Comcast asserts that we have focused too narrowly on wireless competition in devising the cellular eligibility rules. Comcast argues that PCS is a competitor to the wireline "local loop" service of local exchange carriers (LECs) and that one 10 MHz block is not adequate to provide service that is competitive to the wireline local loop. Comcast argues that non-wireline cellular providers have not posed competitive problems, and therefore should be allowed full participation in PCS.

130. Bell Atlantic opposes Comcast's request that we exempt non-wireline cellular providers from the PCS eligibility restrictions. Bell Atlantic argues that Comcast is merely trying to improve its competitive position by this request.[202] PMN agrees that non-wireline cellular carriers should not be entitled to special treatment.[203]

131. We deny Comcast's request that we exempt non-wireline cellular carriers from the PCS attribution rules. Comcast's arguments, which we considered in the Second Report and Order, could impair successful achievement of our goal of creating the maximum number of new competitors.

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[201] See Cablevision Comments at 5.

[202] See Bell Atlantic Comments at 4.

[203] See PMN Comments at 7.

132. We believe that these important modifications will increase the efficacy of our cellular eligibility rules by guarding against the improper exercise of market power by cellular providers through controlling interests in PCS systems overlapping their cellular coverage areas, We believe that these changes will better address our concerns regarding reduced competition without unnecessarily restricting the ability of cellular providers to participate in PCS, and will provide further incentives for investment in and participation by designated entities in PCS.

D. Population Standard

133. When we adopted regulations restricting the eligibility of certain cellular licensees to hold PCS licenses within their cellular service areas, we noted assertions that cellular operators might have unfair competitive advantages over PCS licensees.[204] On the other hand, we also noted the valuable contributions that the expertise of cellular providers could provide to the PCS industry. Finally, we noted that, because of different geographic licensing boundaries for cellular and PCS, there was a potential for excluding cellular providers from PCS markets even though the degree of overlap was minimal. We decided that such an exclusion was neither fair nor desirable for maximizing competition. In resolving these conflicting interests, the Commission adopted the 20 percent ownership attribution rule to define cellular ownership for purposes of the PCS rules. For entities at or exceeding 20 percent ownership, we applied a 10 percent population coverage overlap test to determine whether the cellular licensee would be restricted to a single 10 MHz PCS license.[205]

134. Florida Cellular, PNSC and CTIA request higher population coverage overlap thresholds. Florida Cellular states that the coverage threshold should be raised to 20 percent so that cellular carriers can compete with PCS carriers in providing mobile services.[206] PNSC requests a 20 to 30 percent threshold, claiming that a 10 percent threshold is unduly harsh and unjustified.[207] CTIA argues for a 40 percent overlap threshold and provides a market analysis baaed on the merger guidelines of the Department of Justice and the Federal Trade Commission to support its claim that this degree of coverage overlap will not result in anticompetitive conduct.[208] Radiofone also objects to the 10 percent population threshold.[209]

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[204] See Second Report and Order at ¶¶ 101, 105, 108.

[205] Id. at ¶¶ 104, 108.

[206] See Florida Cellular Petition at 5.

[207] See PNSC Petition at 9-10.

[208] See CTIA Petition at 20.

[209] See Radiofone Petition at 12-15.

135. Cablevision responds that the petitioners requesting a revision of the cellular eligibility rules raise no new facts or arguments and that their petitions therefore should be denied. Cablevision states that the Commission's finding that broadband PCS and cellular will compete justifies maintaining the cellular eligibility rules adopted in the Second Report Order.[210] AIDE agrees, arguing that cellular providers are unlikely to be aggressive in introducing PCS services in their service area.*" Similarly, CIS argues that any relaxation of the current rules would allow Regional Bell Operating Companies (RBOCs) and large LECs with cellular holdings to dominate the PCS market to the exclusion of smaller operators.[212] PCS Action also opposes the requests for changes to the current cellular eligibility threshold, arguing that the current standards appropriately limit cellular participation in PCS.[213] Finally, Time Warner finds that our cellular eligibility rules strike an appropriate balance between preventing anti-competitive behavior and allowing cellular providers to participate in PCS.[214]

136. Decision. We have decided to retain the 10 percent population overlap threshold adopted in the Second Report and Order. Our goal is to provide for entry into the PCS market for the maximum number of viable competitors. We remain concerned about the potential for cellular operators to exercise market power and to reduce the number of viable competitors in the PCS market. We believe that the 10 percent population overlap figure is justified and should foster robust competition and prevent competitive abuse. Balancing the potential benefits of the participation in PCS of cellular providers and the potential harms of reduced competition, we are convinced that the 10 percent coverage threshold is appropriate. With this limit we have ensured the opportunity for the emergence of the maximum number of competitors that the market will support for 90 percent of the population. Increasing this limit beyond 10 percent would create greater risk that consumers would be denied the benefit of vigorously competing service providers. We also believe that this threshold is an important means of encouraging new entrants in each area, thereby enhancing competition. On balance, we conclude that the 10 percent population coverage threshold promotes competition among licensees serving a significant percentage of the population, while providing some recognition of the overlaps that will result from the different licensing areas for PCS and cellular. In addition, as discussed below, we will allow divestiture for those entities with CGSA/PCS service area population overlaps between 10 and 20 percent. In reaffirming our 10 percent threshold, we reject proposals to adopt a national population measure or to use a multiplier formula.

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[210] See Cablevision Comments at 6-7.

[211] See AIDE Comments at 18-20.

[212] See CIS Comments at 4-5.

[213] See PCS Action Comments at 13-15.

[214] See Time Warner Reply at 6.

137. Concord, GCI and MCI argue that coverage of the national population is a better measure of market dominance than coverage of population within a PCS service area. Concord states that the 10 percent overlap standard will preclude many small and mid-size local exchange carriers with partial interests in cellular carriers from participating in PCS. It recommends an eligibility threshold of 1 percent coverage of the national population to ensure that large cellular providers are not able to dominate the market. Concord argues that this standard would allow small and mid-size LECs to participate in PCS.[215] GCI and MCI advocate barring the largest cellular providers from bidding on at least one of the 30 MHz blocks of PCS spectrum. MCI claims that consumer welfare will be served best by barring any cellular provider with more than 10 percent coverage of the nation's population from at least one of the 30 MHz blocks.[216] GCI agrees, claiming that the bidding power of the largest cellular providers will allow cellular providers either to capture the nationwide PCS market or at least to prevent any other licensee from doing so.[217] NYNEX specifically opposes the petitions by MCI and GCI, and asserts that all limitations on cellular participation should be eliminated.[218] PacBell argues against the national population standard proposed by GTE and Sprint, and asserts that the 10 percent rule is clear on its face.[219]

138. We do not believe that a national population teat would achieve our goal of providing the maximum number of new competitors in each market. PCS is being licensed on a local and regional, not national basis. A cellular entity who operates in one city but has no presence in another city would be a new competitor in the latter city. We seek to encourage that entity's PCS participation in the second city, because of the likelihood that the experience and economics it brings from its cellular business will stimulate PCS development in the market and promote vigorous competition to other PCS licensees.

139. Two petitioners, GTE and Sprint, recommend a formula for determining eligibility. They suggest multiplying the percentage overlap of the population in the PCS and cellular service areas by the percentage ownership in the cellular provider, to arrive at an "effective POP" figure. Under this formula, an entity owning 25 percent of a cellular provider that covered 20 percent of the population of the PCS service area would have a 5 percent effective POP figure. GTE suggests that a effective population overlap of 20 percent would be an appropriate eligibility threshold,[220] and Sprint advocates a 20 to 30 percent

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[215] See Concord Petition at 2.

[216] See MCI Petition at l-5.

[217] See GCI Petition at 5-8.

[218] See NYNEX Comments at 5-6.

[219] See PacBell Comments at 9-l 0.

[220] See GTE Petition at 2-5.

figure.[221] These petitioners argue that this approach would allow companies to bid for MTA licenses in service areas where they hold only insulated, minority interests in cellular providers in the service area. They also contend that this approach would enhance the opportunities of independent rural and suburban telephone companies to participate in PCS.

140. We do not believe that this "effective POP" attribution rule would achieve our goal of maximizing the number of new competitors. Under this rule, an entity could have a majority equity interest in cellular licenses covering 40 percent of the population in that service area and remain eligible for 40 MHz of PCS spectrum. This would result in fewer competitive choices for 40 percent of the consumers in that market. This would not achieve our goal of maximizing competitive choices for as many consumers as possible.

E. Post-Auction Divestiture

141. In the Second Report and Order we limited PCS participation by in-market cellular licensees to one 10 MHz PCS license. In its petition for reconsideration, McCaw requests that cellular carriers be permitted to bid for PCS licenses, and to bring their ownership into compliance with the restrictions if they obtain a PCS license for more than one 10 MHz block.[222] This suggestion was supported in replies by Ameritech, Bell Atlantic, Cablevision, Comcast, CTIA, GTE, Sprint, TDS and US West.[223]

142. Decision cur with these parties that it would be reasonable to permit incumbent cellular operators, in certain defined circumstances, to divest their cellular interests in order to become PCS licensees. These operators could become eligible for 40 MHz of PCS spectrum by either reducing population overlap or ownership levels to below the standards discussed above. Either could be accomplished before the auction, but that would involve selling the cellular interests on an assumption that the operator would be the successful bidder for a 30 MHz license.

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[221] See Sprint Petition at 9-l 0.

[222] See McCaw Petition at 5-6.

[223] See Ameritech Reply at l-2; Bell Atlantic Reply at 8-9; Cablevision Comments at 7-8; Comcast Petition at 16- 17; CTIA Comments at 14; GTE Comments at 8-9; Sprint Reply at 4-7; TDS Comments at 10; US West Reply at l-2.

143. We also agree with other commenters, including APC, PCS Action and Time Warner,[224] that allowing unlimited divestiture of the cellular interest after the auction raises concerns that abuses could occur during or after the bidding process.[225] If afforded an unlimited opportunity to divest, cellular operators with significant areas of overlap could have incentives to use the bidding process to forestall licensing of new competitors in the market, because the cellular operator would be in control of both a cellular system and one of the three or four possible 30 MHz broadband PCS licenses. There are instances, however, in which such abuses are unlikely to occur. A cellular operator with less than 20 percent population coverage in the PCS service areas would have little incentive to risk incurring penalties for abusing the bidding process when PCS offers greater potential to serve the entire MTA or BTA. These cellular operators have more to gain by broadening their customer base by offering competitive PCS services in place of their overlapping cellular interests in excess of 10 percent than they do by abusing the bidding process to forestall competition. Operators with population overlaps in excess of 20 percent have increasingly greater incentives not to start competitive PCS businesses.

144. We conclude that it is appropriate to allow cellular operators to divest themselves of attributable cellular interests that do not comply with the cellular/PCS cross ownership restriction after winning more than 10 MHz of PCS spectrum in the PCS auctions, provided that the divestiture occurs within the short time frame we set forth below. However, because a cellular operator with significant overlaps may have incentives to delay the rapid introduction of PCS service, we will permit cellular divestiture only for cellular operators that serve less than 20 percent of the PCS service area. If the overlap consists of several cellular licenses, the incumbent may sell some of the licenses and keep others if the result is in compliance with the attribution and population overlap thresholds. This will help achieve our goals of rapid introduction of PCS service and competitive delivery because those entities with cellular operations near a PCS service area may be able to combine the operation into a single efficient operation that would benefit consumers.

145. We have decided to allow the post-auction partial sale of attributable cellular interests so that entities may come into compliance with the cellular eligibility rules. Procedurally, we will require that a PCS applicant that meets the criteria for post-auction divestiture submit with the PCS license application (short-form) a statement that, if successful in obtaining more than 10 MHz of spectrum, it will come into complete compliance with the

[224] See APC Reply at 1 O-l 1; PCS Action Comments at 15- 16; Time Warner Reply at 6-8.

[225] See Letter from APC to the FCC at 2 (May 3 1, 1994); Letter from PCS Action to the FCC at 2 (May 27, 1994).

cellular/PCS cross-ownership restriction within 90 days of the PCS license grant.[226] If more than 10 MHz is obtained, the long-form application for PCS licensing must be accompanied by a signed statement from the applicant that the cellular property causing the applicant to be in excess of the 10 percent population overlap, or enough equity to bring the entity into compliance with our attribution threshold, will be divested within 90 days of the PCS license grant to bring ownership interest below the permitted attributable ownership limits. If the PCS applicant is otherwise qualified, the PCS application will be granted subject to a condition that the PCS licensee come into compliance with the PCS/cellular cross-ownership rule within 90 days of grant.

146. As a condition of its PCS license, within 90 days of PCS license grant the PCS licensee must certify to the Commission that the applicant and all parties to the application have come into compliance with our PCS-cellular cross-ownership rules. If the PCS licensee fails to submit this certification within 90 days, we will invoke the condition on the PCS license, cancelling it immediately and retaining all monies tendered. In addition, we may investigate whether the certifications on divestiture are evidence of misrepresentations that call into question the p&y's qualification to hold its cellular license. The PCS licensee may divest the prohibited interest to an interim independent trustee if a buyer has not been secured in the required time frame as long as the applicant has no interest in or control of the trustee, andthetrusteemaydisposeofthelicenseasitseesfit.

V. CONSTRUCTION REQUIREMENTS

147. In the Second Report and Order, we stated our expectations that broadband PCS would be a highly competitive industry and that licensees would have the incentive to construct facilities to meet the demand for service in their licensed areas. We concluded that specific channel loading requirements are unnecessary; however, we required licensees to meet specified construction benchmarks to ensure efficient spectrum utilization and service to the public. Specifically, we required licensees Fo offer service to one-third of the population in their service area within five years of licensing, two-thirds of the population in their service area within seven years, and 90 percent of the population within Fen years. We stated that failure to meet these requirements would result in forfeiture of the license and the licensee would be ineligible to regain it."'

[226] The Commission shortly will adopt competitive bidding rules applicable to broadband PCS. See Second Report and Order, PP Docket No. 93-253, FCC 94-61, released April 20, 1994.

[227] See Second Report and Order at ¶¶ 132-134.

148. Petitioners' Requests. Several petitioners request reconsideration of the construction requirements and submit a variety of alternatives. In its petition, PacBell supports the five-year and seven-year service area requirements but requests that we eliminate the ten-year, 90 percent population coverage requirement, arguing that the 90 percent coverage requirement is too stringent in view of the PCS power limits. PacBell also argues that a PCS licensee should not have to forfeit its license if it does not meet the construction requirements.[228] PCIA also opposes the 90 percent population coverage requirement and similarly argues that licensees should not have to forfeit their license if they fail to meet the construction requirements.[229] Mebtel and RCA also oppose the requirements, arguing that the requirements will adversely affect designated entities.[230] Mebtel recommends that designated entities be allowed ten years to provide service to one-third of the population of their service area and fifteen years to provide service to two-thirds of that population.[231]

149. Some parties, including Alliance and Columbia, recommend that areas unserved for five years be re-licensed to a second party in a manner similar to relicensing of cellular unserved areas.[232] RCA recommends a similar approach, but with a seven-year period before re-licensing.[233] Columbia argues that the use of the "cellular fill-in" model would allow the market to determine the development of PCS. Alliance and Columbia both argue that the fill-in approach would be more equitable to the licensee and more administratively efficient than the current population coverage requirements.[234] Columbia also contends that standards for ascertaining the service area of a PCS system are vague and therefore the Commission's license forfeiture policy will be unenforceable.[235]

150. PNSC recommends excluding all BTA blocks from the construction requirements, and Southwestern Bell recommends excluding the 10 MHz BTA blocks.[236]

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[228] See PacBell Petition at 5. See also UTC Petition at 6.

[229] See PCIA Petition at 6.

[230] See Mebtel Petition at 3; RCA Petition at 1-2.

[231] See Mebtel Petition at 3.

[232] See Alliance Petition at 6; Columbia Petition at 5; Intelco Petition at 4-7; PCIA Petition at 6.

[233] See RCA Petition at 6-7.

[234] See Alliance Petition at 6; Columbia Petition at 5.

[235] See Columbia Petition at 5.

[236] See PNSC Petition at 10; Southwestern Bell Petition at 2-7.

PNSC recommends a construction requirement for BTA licensees of 20 percent population coverage in five years, 30 percent in seven, and 50 percent in ten years. Southwestern Bell argues that 10 MHz licensees will not be able to provide the same scope of services or realize the same economies of scale as licensees of larger spectrum blocks and recommends that non-aggregated 10 MHz licensees be required to meet only a 25 percent population coverage requirement within ten years.

151. Other parties propose other modifications to the population coverage requirements. Sprint recommends permitting cellular PCS providers to count existing cellular population coverage toward the PCS requirements.[237] BellSouth recommends eliminating the population coverage requirements entirely and simply requiring a licensee to build a system within a five-year period.[238] Motorola argues that the current construction schedule, together with the stringent penalty of forfeiture, will limit the development of pedestrian and in-building PCS because licensees will face many economic hurdles and pedestrian PCS would cost more to implement. Motorola requests that we adopt a flexible plan that permits licensees to specify a construction plan with which they must comply to accommodate different system configurations and different coverage situations. Motorola argues that, at a minimum, the license forfeiture policy should be tempered by providing an opportunity for the licensee to demonstrate that its service is satisfactory, regardless of the overall population coverage attained.[239]

152. Responses. A number of parties expressed support for the existing construction requirements. For example, GCI and NYNEX recommend that the Commission maintain its construction requirements to ensure delivery of PCS services as quickly as possible.[240] NYNEX contends that PCS applicants can adjust their bids in the auction process to reflect the difficulties of meeting construction requirements in each market. Northern Telecom also expresses support for the Commission's construction requirements, but proposes that the definition of population served include rural residents where they work or shop, and that the Commission develop guidelines for waivers of the construction requirements.*"' On the other hand, CUC opposes overall relaxation of the construction requirements, arguing that relaxation would delay PCS implementation. It does support adoption of a waiver standard and relaxing the construction requirements in rural areas. CUC further argues that the Commission should not relax its construction requirements if the licensee has the option of partitioning its service

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[237] See Sprint Petition at 14.

[238] See BellSouth Petition at iii.

[239] See Motorola Petition at 5-6.

[240] See GCI Comments at 13; NYNEX Comments at 8-9.

[241] See Northern Telecom Reply at 6-9.

area.[242] AIDE argues that if we allow markets to be partitioned, each partitioned market should be subject to independent construction requirements.[243] PacBell opposes Sprint's suggestion that cellular carriers be permitted to include their existing coverage in meeting PCS coverage requirements.[244]

153. MCI asserts that some relaxation of the construction requirements is necessary if base and mobile power limits are not substantially increased.[245] US West opposes the 90 percent construction requirement, asserting that 90 percent coverage will increase the cost of PCS fourfold compared to a 67 percent population coverage requirement. It states that a stringent construction requirement is not necessary to prevent warehousing of spectrum because the spectrum will be purchased at auction. As part of its filing, US West submits an analysis of nine large western BTAs that indicates that increasing population coverage from 67 to 75 percent results in only a moderate increase in the geographic area that must be served. On the other hand, increasing population from 75 to 90 percent results in a very large increase in the geographic area that must be covered.[246]

154. Decision. We believe that PCS will be a highly competitive service and that licensees will have incentives to construct facilities to meet the service demands in their licensed service areas. Further, we believe that our use of competitive bidding for PCS licensing and the restrictions on the amount of spectrum that a licensee may control in a geographic area will limit the likelihood that spectrum will be warehoused. Nevertheless, we continue to believe that minimum construction requirements are necessary to ensure that PCS service is made available to as many communities as possible and that the spectrum is used effectively. We note that the Reconciliation Act amendments require the Commission to impose performance requirements.[247] While we agree with GCI, NYNEX, and others that construction requirements are needed to ensure service in a timely fashion, we also agree that relaxation of the requirements is desirable to ensure an economical deployment of the service to promote opportunities for PCS "niche" services, and to facilitate a competitive market.[248]

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[242] See CUC Comments at 7.

[243] See AIDE Comments at 5.

[244] See PacBell Comments at 8.

[245] See MCI Comments at 17.

[246] See US West Reply at 7-9.

[247] See 47 U.S.C. § 309(i)(4)(B), as amended by the Reconciliation Act.

[248] See GCI Comments at 13; NYNEX Comments at 8-9.

155. Accordingly, we are amending the construction requirements as follows. All 30 MHz broadband PCS licensees will be required to construct facilities that provide coverage to one-third of the population of their service area within five years of initial license grant and to two-thirds of the population of their service area within ten years. We will require the 10 MHz licensees to meet a single construction requirement of providing coverage to one-fourth of the population of their service area within five years; or alternatively, they may submit an acceptable showing to the Commission demonstrating that they are providing substantial service. We recognize that these requirements are less than the requirement for narrowband PCS licensees, but we believe this difference is appropriate given the higher expected construction costs involved for broadband PCS.[249] Moreover, since licensees must purchase their licenses, they will have added economic incentives to construct their systems as rapidly as possible and introduce service to a significant percentage of the population. In this regard, we also believe that these relaxed construction requirements may increase the viability and value of some broadband licenses, especially those in less densely populated service areas. Finally, since most areas are already served by cellular and SMR providers, we believe it unnecessary to require PCS licensees to provide identical or similar services to areas where it is uneconomic to do so. With regard to the 10 MHz licensees, we believe that the reduced construction requirement will make these licenses more attractive to applicants intending to provide residential, cutting-edge niche services or services to business and educational campuses where the population may be small except during business or school hours.

156. At the five-year benchmark we will require all licensees, and again at the 10-year benchmark for 30 MHz licensees, to file a map and other supporting documentation showing compliance with the construction requirements. Licensees failing to meet the population coverage requirements described above will be subject to the license forfeiture penalties adopted in the Second Report and Order.[250] We recognize that even with these requirements, factors such as incumbent microwave operation or sparse population density in some instances could make compliance difficult. In instances where the circumstances are unique and the public interest would be served, the Commission will consider waiving the requirements on a case-by-case basis.[251] These revised construction requirements will ensure efficient spectrum utilization and promote significant nationwide coverage without imposing substantial cost penalties on licensees that serve less densely populated areas. In this regard,

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[249] The construction requirements for narrowband PCS are set forth in Memorandum Opinion and Order, GEN Docket No. 90-314 and ET Docket No. 92-100, 9 FCC Rcd 1309, 1313-1314, ¶¶ 27-34 (1994), recon. pending.

[250] See Second Report and Order at ¶¶ 133-134.

[251] See WAIT Radio v. FCC, 418 F.2d 1153 (D.C. Cir. 1969).

we believe that these changes generally address the concerns of those parties that suggested lowering the construction requirements for designated entities or for BTA service areas.[252]

157. We also recognize the desirability of encouraging more than one provider to serve a diverse geographic area, and note that resale of a licensee's geographic area to other entities, subject to the licensee's control, is not prohibited by our rules. Accordingly, we recognize that licensees may resell spectrum, and believe that this will facilitate the deployment of PCS. Whether or not the licensee enters into resale arrangements, it will be responsible for insuring that the coverage requirement and all the other requirements of our rules are met. The reseller will not be a separate licensee, but rather, will operate subject to the control of the licensee. We believe that resale will encourage service provision, particularly to rural areas, and allow smaller, predominantly rural companies to participate in PCS. We intend to examine in another proceeding whether resale arrangements confer attributable interests on the reseller. See Section IV, supra.

158. In summary, our relaxed construction requirements will foster provision of PCS services and will promote diversity in their provision. Permitting licensees to resell service subareas, subject to the licensee's control, will permit smaller, rural companies to provide PCS without participating in the competitive bidding process. Finally, we intend to monitor closely the development of PCS in rural and other under-served areas and, if necessary, will readdress these construction requirements to ensure that our goals for wide area service are met.

VI. TECHNICAL, STANDARDS

A. Roaming and Interoperability Standards

159. In the Second Report and Order, the Commission provided maximum flexibility in technical standards to allow PCS to develop in the most rapid, economically feasible and diverse manner. Specific technical standards were prescribed only to the extent necessary to avoid harmful interference. The Commission recognized that several industry technical and standards groups were addressing matters related to PCS technical standards. It encouraged those groups to consider ways of ensuring that PCS users, service providers, and equipment manufacturers could incorporate roaming, interoperability and other important features in the most efficient and least costly manner, noting that PCS will be more useful to the extent that users are not limited by geography or by their ability to use their equipment with different systems.

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[252] We will also allow the licensee to use, if they choose to do so, the 2000 census to determine the lo-year construction requirement, rather than the 1990 census specified in the Second Report and Order. This change ensures that licensees will not be required to meet benchmarks based on obsolete data.

160. **Petitioners' Requests**. NCS, Motorola, and TIA request that we reconsider our decision not to adopt PCS interoperability requirements.[253] NCS requests that we adopt standards to ensure interoperability and nationwide roaming. It argues that such standards are needed for national security and emergency preparedness purposes.[254] Motorola and TIA recommend that we require all equipment used by licensed PCS operators to meet interoperability standards developed by a standards body accredited by the American National Standards Institute (ANSI).[255] Motorola argues that interoperability standards will promote international acceptance of U.S. PCS technology and encourage competition between PCS licensees, since consumers could use the same equipment regardless of the licensee to which they subscribe, TIA states that technical standards are needed to ensure that PCS services are provided at the most competitive prices.[256]

161. **Responses**. Most responding parties oppose the petitioners' requests that we adopt PCS technical standards. For example, APC, GTE and Northern Telecom express concern that the development of ANSI-approved technical standards would delay the implementation of PCS.[257] MCI and Nextel argue that mandatory standards would inhibit technical advances that would enable licensees to deliver a broad range of services to the public.[258]

162. **Decision**. We continue to believe that a flexible approach, applying only those standards necessary to prevent interference, is appropriate. As indicated in the Second Report and Order, this will allow PCS to develop in the most rapid, economically feasible and diverse manner.[259] We agree with NCS and others that interoperability for PCS is an important and beneficial goal. We believe, however, that acceptable interoperability is likely to emerge between PCS licenses in a timely manner without our intervention, Our decisions to provide for large regional MTA licenses, to move all PCS licenses to the lower band, and to permit further aggregation of spectrum blocks across geographic regions all foster wide-

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[253] Texas Emergency also requests that we adopt a uniform standard for enhanced emergency 911 services. These matters are addressed in Section VI.E.

[254] See NCS Petition at 2.

[255] See Motorola Petition at 3.

[256] See TIA Petition at 3.

[257] See APC Comments at 15- 17; GTE Comments at 13- 14; Northern Telecom Comments at 6-9.

[258] See MCI Comments at 21-22; Nextel Comments at 15-16.

[259] See Second Report and Order at ¶¶ 135-138.

area roaming and interoperability. In addition, competitive bidding for PCS licenses will facilitate the development of regional or nationwide systems.

163. We also are aware that the industry is now working aggressively to complete several voluntary interoperability standards for PCS in a timely manner. We strongly support these efforts and continue to encourage the industry's work in this area. The availability of interoperability standards will deliver important benefits to consumers and help achieve our objectives of universality, competitive delivery of PCS, that includes the ability of consumers to switch between PCS systems at low cost, and competitive markets for PCS equipment.

164. Interoperability, not only nationwide on one block but also between PCS spectrum blocks, should be in the business interest of all PCS providers. Such broad interoperability will increase the economies of scale in manufacturing PCS equipment such as handsets, will made consumers more likely to subscribe to PCS because they can easily move from carrier to carrier without having to purchase new handsets, and will make it easier for PCS licensees to aggregate blocks of PCS spectrum up to 40 MHz and to create wide-area or national PCS systems, For these reasons, we believe that it is in the public interest for the industry eventually to achieve compatible interoperability standards for all PCS spectrum blocks. Nevertheless, we understand that the industry is not yet ready to arrive at any standard. In addition, we do not want to discourage innovation in designing PCS services. Therefore, at this time we are not mandating that the industry arrive at a single interoperability standard across all PCS spectrum blocks.

165. We intend to monitor the industry's progress in developing and implementing PCS technical standards.[260] In particular, we hope, that some of the standards proposed for PCS will be adopted or near completion at the time of the broadband PCS auction. If we find that the development of PCS technology is not proceeding in a manner that will accommodate roaming and interoperability, we may revisit this issue and consider what actions the Commission may take to facilitate the more rapid development of appropriate standards. Finally, to facilitate international acceptance of U.S. PCS technology, we will be receptive to requests seeking our endorsement of completed ANSI standards, provided that such endorsement does not limit the flexibility of PCS licensees to select standards and technologies best suited to their needs.

B. PCS Power Limits

166. In the Second Report and Order, the Commission established a maximum e.i.r.p. of 100 watts and a maximum antenna height above average terrain (HAAT) of 300 meters for

[260] We will be conducting a comprehensive review of the CMRS market on an annual basis. See CMRS Second Report and Order. In that context we may review PCS interoperability and standardization issues.

PCS base stations.[261] The Commission recognized that most PCS experimental systems operated at a maximum power of 10 watts e.i.r.p., but adopted a limit of 100 watts e.i.r.p. for base stations to permit additional flexibility in the design of PCS systems. It also specified a maximum power limit of 2 watts e.i.r.p. for mobile units.

167. Petitioners' Requests. Eleven parties filed petitions for reconsideration requesting increases in the PCS power limits, APC, Ameritech, MCI, Motorola, Northern Telecom, PacBell, PacTel, PCIA, Sprint, Time Warner and US West argue that higher-powered PCS base stations should be permitted. The majority of these petitioners request that the power limit of a PCS base station be increased to 1640 watts e.i.r.p.[262] These parties state that permitting higher power will allow PCS providers to use large cells and deploy advanced technologies, take advantage of high gain antenna technology, more effectively compete with cellular, and better cover rural areas. Time Warner and PacBell recommend that no limit be placed on power and argue that the 100 watt limit will not allow economic deployment of PCS.[263]

168. In requesting an increase in the power limit, PacBell and Northern Telecom indicate that most base stations would actually operate using low power transmitters coupled with high gain, directional antenna systems that boost the radiated signal levels.[264] Ameritech, MCI, Sprint, US West and others also support the use of high-gain antenna technology. They submit that the same antennas are also used to receive signals from subscriber units, amplifying the level of the received signal. Thus, a low power transmitter using a high gain antenna at the base station permits the system to remain "balanced," allowing low power subscriber units to communicate with the base station over the larger coverage area provided by the higher radiated base station power.[265] The petitioners, for example APC, Northern Telecom, and PacBell, argue that human exposure to radio frequency energy (RF) can be

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[261] See Section 24.231 of the Commission's Rules. Antenna heights up to 2000 meters are permitted with a corresponding reduction in power.

[262] Many of the petitioners request the power be increased to 1000 watts e.r.p., which is equivalent to 1640 watts e.i.r.p. By comparison, the cellular rules permit the power of a base station to be up to 500 watts e.r.p. See 47 C.F.R § 22.904. Equivalent isotropically radiated power is the product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna. Effective radiated power is the product of the power supplied to the antenna and its gain relative to a half-wave dipole in a given direction. See 47 C.F.R. § 2.1.

[263] See Time Warner Petition at 13; PacBell Petition at 13.

[264] See PacBell Petition at 3; Northern Telecom Petition at 5.

[265] See Ameritech Petition at 2; MCI Petition at 2; Sprint Petition at 15; US West Petition at 12-13.

controlled through the design of the base station and the requirements of the current regulation of biohazards can be met independent of the overall transmitter power limit set by the Commission.[266]

169. In their petitions, MCI and PCIA also request that we increase the maximum power limit for certain types of mobile and portable units from 2 to 20 watts e.i.r.p.[267] They argue that this would permit the use of higher power for PCS vehicular-mounted units and special types of non-handheld equipment such as pay telephones installed at special events, emergency restoration telephone systems, and telephones installed in areas where landline facilities are not available or justifiable due to intermittent use.[268]

170. Responses. The majority of the responding parties support the petitioners' requests that the power limit be raised.[269] These parties state that operation at higher power levels would decrease the number of base stations rquired for coverage, especially in sparsely populated areas. They further submit that the larger coverage area provided by higher power operation will also facilitate compliance with the construction requirements, thereby lowering operating costs.

171. On the other hand, AT&T indicates that the European Telecommunications Standards Institute (ETSI) recently rejected a similar proposal for increased power for the "DCS 1800" standard,[270] and limited base station transmitter output power to 40 watts and mobile transmitter power to 1 watt. AT&T argues that an increase in base station power limits is unnecessary without a corresponding increase in handset power limits, which leads to more expensive handsets that are heavier, have a shorter battery fife, and interfere with other electronics.*" Apple and Rolm request that we limit the e.i.r.p. of all transmitters operating on channels adjacent to the unlicensed band to no more than 2 watts to limit interference to

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[266] Increasing the separation between individuals and the antenna, using high gain antennas at the base station, and other techniques can be used to meet limits on human RF exposure. See APC Petition at 6-7; Northern Telecom Petition at 5; PacBell Petition at 4.

[267] A power of 20 watts e.i.r.p. is quivalent to 12 watts e.r.p.

[268] See MCI Petition at 7-8; PCIA Petition at 8.

[269] See APC Comments at 20-21; Bell Atlantic Comments at 14; CUC Comments at 12; GCI Comments at 2-3; MCI Comments at 18-19; Murray Comments at 6; Northern Telecom Comments at 3-6; Omnipoint Comments at 4, 13; and PacBell Comments at l-3.

[270] DCS 1800, which operates in the 1800 MHz region of the spectrum, is an extension of the pan-European digital cellular standard, "Global System for Mobile Communications" (GSM).

*" See AT&T Reply at 6.

unlicensed devices.[272] Nextel states that higher power limits would only encourage PCS providers to duplicate cellular service rather than develop new services.[273] TDS, UTC and others argue that any increase in the power limit should not result in increased interference from PCS systems to other radio services.[274] API opposes increasing the power level of subscriber units absent strict coordination requirements.[275]

172. Decision. We believe that increasing the maximum base station power limit to 1640 watts e.i.r.p. will improve PCS licensees' ability to configure their systems to best serve the needs of their customers and to compete with other mobile services such as cellular and wide-area SMR. Higher power will allow individual PCS base stations to serve larger geographic areas more effectively. We believe that the ability to serve larger geographic areas will also promote our goal of service to less populated areas. The flexibility to use higher power will provide PCS system operators greater flexibility in determining system architecture, i.e., the number of base stations deployed to serve a given area, based on service demands rather than adequate coverage considerations. This change will also facilitate the use of new technologies, such as high-gain, directional antennas, as well as potential improvements to the design of subscriber products. We do not agree with Apple and Rolm that PCS operations on channels adjacent to the unlicensed spectrum should be limited to two watts. We see no reason to restrict licensed PCS operations to afford additional protection to unlicensed devices. Such a limit would be detrimental to licensed PCS services and unfairly disadvantage blocks A and C that are adjacent to the unlicensed spectrum. In addition, we note that unlicensed operations will be relatively short range and therefore can be designed to resist adjacent channel interference. Accordingly, we are amending the rules to allow PCS base stations to operate with up to 1640 watts e.i.r.p. We are also amending PCS power/HAAT coordination distance requirements to reflect this increased maximum power level.

173. While we believe that the power limit for base stations should be increased to 1640 watts e.i.r.p., this increase in power should not be used in such a manner that the resulting PCS system becomes unbalanced so that mobile units are unable to communicate with the base station. To ensure balanced base-to-mobile and mobile-to-base communications, we are also limiting the transmitter output power of the base station to 100 watts. By limiting the transmitter output power as well as e.i.r.p., we intend to promote the use of the high gain, directional antennas to achieve the larger coverage areas sought by the petitioners.

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[272] See Apple Comments at 4-5; Rolm Reply at 2.

[273] See Nextel Comments at 15.

[274] See e.g., TDS Supplemental Comments at 1-2; UTC Comments at 14-16.

[275] See API Comments at 4.

174. We disagree with those parties requesting higher power for certain mobile and portable units. A lower power output limit minimizes exposure to radio frequency energy, see infra Section VIII. Further, we agree with API that increasing the power output limit for subscriber units would necessitate unreasonably stringent and unenforceable coordination requirements. Unless the location of such higher power mobile units could be strictly controlled, interference could result to fixed microwave operations and/or to other PCS systems in adjacent service areas. For these reasons, we are not increasing the maximum power limit for mobile and portable PCS transmitters as requested by MCI and PCIA.

C. Protection of Fixed Microwave Operations

175. In the Second Report and Order, the Commission stated that a principal concern in the authorization of PCS in the 2 GHz band is that existing fixed microwave operations be protected.*" It adopted the following approach for providing such protection: 1) required PCS licensees to provide the same level of protection to microwave operations that they currently provide under Part 94 of our Rules and through the use of EIA/TIA Bulletin TSB1 O-E criteria and methodology;[277] 2) specified antenna height and power limits for PCS; 3) adopted requirements for PCS licensees to coordinate with fixed microwave operators; and, 4) provided methods for calculating interference from PCS to incumbent microwave operations.*'*

176. Specifically, in the Second Report and Order, we adopted carrier-to-interference criteria for protection of short and medium length microwave links of 25 km (about 15 miles) or less. For path lengths longer than 25 km, where reliability is more dependent on the relative noise threshold and faded signal level, we limited the level of an interfering signal to that which would cause a 1 decibel (dB) degradation in the signal-to-noise ratio for analog systems or which would cause an increase in bit-error-rate (BER) from 10" to 10^{-5} for digital systems. Finally, we endorsed procedures for calculating interference to microwave operations.[279]

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[276] See Second Report and Order at ¶ 141.

[277] Cf. 47 C.F.R. § 94.63. We also stated that, as under Part 94 of our rules, other acceptable industry-developed interference procedures, such as those developed by the EIA, the Institute of Electrical and Electronics Engineers (IEEE) and the ANSI, may be used in performing interference analyses. See Section 24.237(d) of the Commission's Rules.

[278] See Second Report and Order at ¶ 141-145, 163-174.

[279] The procedure for calculating the level of PCS signals at microwave receivers requires that the PCS licensee compute the sum of the transmitters' powers from proposed PCS base stations and all portable and mobiles associated with the base stations at each microwave receiver within the coordination distance of the base stations. See Second Report and Order, Appendix D.

177. Petitioners' Requests. Ten parties request reconsideration of issues relating to protection of microwave operations.[280] Several parties request reconsideration of our decision to use Bulletin TSB1 O-E. These parties request that the Commission adopt newly developed industry standards for protection of fixed microwave stations from PCS. Specifically, Alcatel, APC, API, Ameritech, Motorola, TIA and PCIA recommend using EIA/TIA Bulletin TSB10-F when it is completed, instead of the procedures in Appendix D of the Second Report and Order.[281] They argues that Bulletin TSB10-F, when adopted, will likely be the benchmark industry standard for determining PCS-microwave interference. API supports using TSB10-F as the only method, and states that allowing a number of calculation methods is unwise and will create needless uncertainty. Alcatel, Motorola, PCIA, and TIA also request that we clarify the rules to indicate that other appropriate interference procedures developed by the industry may be used.[282] A number of the petitioners also suggest specific changes to the procedures in Appendix D of the Second Report and Order.

178. Motorola, TIA, and PCIA object to the use of the Longley-Rice propagation model that was stipulated for interference calculations at Appendix D of the Second Report and Order.[283] They argue that there are technical problems with the use of "urban correction factors" with the Longley-Rice model, as adopted by the Commission. Instead, they recommend that an appropriate model accepted by industry be used. For example, Motorola and PCIA argue that the propagation model in TSB10-F represents the efforts of all affected groups and should be adopted.[284]

179. Bell Atlantic suggests that we adopt rules to eliminate "excess margin" in microwave systems.[285] It argues that such excess fade margin is not needed for reliable microwave communications and reduces the amount of available spectrum to PCS operators. Bell Atlantic also recommends that we require microwave licensees to upgrade their systems when the change will reduce interference and when the PCS operator is willing to pay for the upgrade.

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[280] The parties requesting reconsideration of these matters include: Alcatel, APC, API, Ameritech, Bell Atlantic, Blooston, Motorola, T'IA, PCIA and UTC.

[281] See Alcatel Petition at 4-5; APC Petition at 8; API Petition at 6; Ameritech Petition at 2-3; Motorola Petition at 6-7; TIA Petition at 6-l 1; PCIA Petition 7, 1 O-12.

[282] See Alcatel Petition at 5-6; APC Petition at 11; TIA Petition at 1 O-l 1.

[283] See Second Report and Order at Appendix D.

[284] See Motorola Petition at 7; TIA Petition at 11; PCIA Petition at 12.

[285] See Bell Atlantic Petition at 22. Microwave systems are typically designed with additional power or signal strength, called margin, to provide for attenuation of the signal due to changes in propagation or weather conditions that may occur.

180. UTC asserts that the current PCS rules are contradictory. It notes that the rules provide for blanket licensing of all transmitters in a service area and at the same time require an engineering analysis before filing an application for a new or modified facility. UTC suggests that Section 24.11 be clarified to state that despite receiving a blanket license, licensees will need separate applications and authorizations for each station to assure that the proposed facility will not cause interference to existing microwave stations. UTC also recommends that we adopt coordination procedures based on Part 21 of our Rules and that all coordination requests be in writing.[286] API recommends that we require formal coordination by a third party.[287]

181. API requests that we specify sanctions for PCS licensees that cause interference to incumbent fixed microwave operations. Specifically, API recommends that we require PCS entities to cease operation upon notification of interference by a microwave licensee, establish a scale of significant fines and/or forfeitures to deter violations, and make available expedited procedures to ensure that complaints are resolved quickly.[288] Blooston argues that the PCS rules fail to protect common carrier microwave operations in the adjacent 1990-2110 MHz band and should therefore be reworked to extend this protection.[289]

182. Responses. The responding parties generally support the use of EIA/TIA Bulletin TSB10-F and recommend that we adopt this standard when it is completed.[290] TDS states that although Appendix D may initially be used, improvements involving propagation modeling and urban correction factors need to be addressed. UTC supports giving equal consideration to either the interference standard found in Appendix D or a standard developed by a recognized authority. AAR states that it supports TIA's proposal that we adopt an industry consensus with Bulletin 10-F, provided that fixed microwave licensees are provided the same level of protection as under the current standard, Bulletin 10-E. PacBell states that we should adopt the Okumura-Hata propagation model, arguing that this model provides more realistic estimates. PCIA concurs that the Longley-Rice model should not be the only propagation model permitted if the industry can agree on the use of other models.

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[286] See UTC Petition at 16-17. These procedures are set forth at 47 C.F.R. § 22.100.

[287] See API Petition at 7.

[288] See API Petition at 8.

[289] See Blooston Petition at 2.

[290] See Alcatel Comments at 2-4; APC Comments at 22; API Comments at 3; AAR Comments at 3-4; TIA-NED Comments at 2-6; MCI Comments at 19-20; TDS Supplemental Comments at 3; PacBell Comments at 3-4; PCIA Comments at 9.

183. Some parties support UTC and API's recommendation that we adopt prior coordination procedures, arguing that this would insure that all potential issues of interference are resolved prior to licensing and deployment.[291] MCI opposes API's proposal for a formal third-party coordination requirement, arguing that such a requirement would create delays *in* implementing PCS.[292]

184. Several commenters support Bell Atlantic's proposal to require microwave licensees to upgrade their system when it is shown that an upgrade will reduce interference and the PCS operator is willing to pay for the upgrade. API disagrees with those parties that argue that interference protection margins used for microwave systems are excessive. Alcatel does not oppose elimination of "excess margins," but asserts that neither the Commission nor an industry standards group should define what constitutes an excess margin. It states that instead, these objectives should be determined by individual users through interaction with appropriate frequency coordinators and potentially affected users.[293]

185. UTC supports API's proposal for penalties to deter creation of objectionable interference to microwave users. It argues that such penalties would cause PCS proponents to use caution and would therefore help to avoid interference situations. MCI opposes API's request for sanctions on PCS licensees causing interference. It argues that API's proposal would give microwave licensees undue power to shut down PCS operations merely by notifying the licensee that it has detected objectionable interference.

186. Decision. In the Second Report and Order, we stated that with certain modifications, the level of protection provided under Part 94 of our rules and through application of TSB1 O-E criteria and methodology is appropriate and will provide adequate protection to microwave users from PCS operations. We also stated that we would accept the new TSB1 O-F procedures, when adopted by EIA/TIA, for use in demonstrating compliance with our technical standards for PCS to fixed microwave interference.[294] Although many parties request that operators be required to use TSB10-F exclusively instead of that set out at Appendix D of the Second Report and Order, we cannot adopt this standard as the only acceptable method for determining interference to microwave operations from PCS operations until we have had a chance to evaluate its merits and provide it to the public for comment.

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[291] See AAR Comments at 4; Alcatel Comments at 3; API Comments at 3-4.

[292] See API Petition at 2-4.

[293] See Alcatel Reply at 3-4.

[294] TSB1 O-F was adopted on May 3 1, 1994; TIA Telecommunications Systems Bulletin Number 10-F, Interference Criteria for Microwave Systems, May 1994, (TSB10-F). On June 1, 1994, TIA submitted a Supplement to Petition for Reconsideration to report that TSB10-F is now a standard adopted by an ANSI-accepted body.

Therefore, we will maintain the procedures adopted in the Second Report and Order with some modifications.[295]

187. We concur that a prior coordination procedure is necessary to ensure that potential issues of interference are resolved before deployment of PCS systems.[296] We believe that the Part 21 coordination requirements are appropriate for coordination of PCS and microwave facilities. These coordination procedures are generally familiar to the parties involved and are sufficient to address potential interference problems. Accordingly, we will amend the PCS rules to include coordination procedures similar to those contained in Part 2 1. We note that coordination under Part 21 does not require written notification. We find no reason to require that the PCS-to-microwave coordination be treated differently.

188. We agree with Bell Atlantic that permitting PCS entities to pay for and upgrade incumbent microwave operation, such as providing better antennas or filters that would prevent interference, would facilitate the implementation of PCS. Specifically it would provide more choices and opportunity for sharing between the two services. However, we believe that mandating such upgrades of the incumbents' facilities would be difficult to regulate. Therefore, we will allow for such upgrades when all parties agree but will not mandate them.

189. We share Bell Atlantic's concern that excess fade margins in incumbent systems will inhibit the ability of PCS entities and microwave operations to share spectrum. However, we also recognize that microwave systems vary in size, complexity and degree of reliability needed. Therefore, we see no way of adopting general rules mandating an acceptable fade margin that would apply fairly in all cases. Accordingly we will not set limits on the amount of allowable fade margin in a microwave system. We suggest, however, that incumbent licensees limit the fade margin in their systems to only that necessary for reliable service so as to help facilitate the implementation of PCS.

190. Regarding Blooston's assertion that Section 24.233 does not provide protection to common carrier point-to-point microwave radio service (PPMRS) operations in the 21 10-2130 MHz and 2160-2180 MHz bands, we note that our Rules contain out-of-band radiation

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[295] While we continue to believe the procedures adopted in the Second Report and Order are accurate and reliable, parties may use other methods such as TSB1 O-F as alternative methods. As indicated in the Second Report and Order, if both the PCS entity and the incumbent microwave entity agree to an alternative criteria for interference protection, then that criterion may be used. See Second Report and Order at n.118. We continue to believe that this flexibility is desirable, in light of the varied technologies that may be used for PCS.

[296] We note that we recently adopted Part 21 coordination procedures in the Emerging Technologies proceeding for 2 GHz microwave facilities that will be relocated to higher bands. See Second Report and Order, ET Docket No. 92-9, at ¶ 60.

limits that must be met by PCS entities. We also note that under our revised allocation PCS is only allocated spectrum in the 1850-1990 MHz band, so there is 120 MHz of separation between PCS and PPMRS operations.

191. With regard to Blooston's request that we require PCS licensees to protect common carrier microwave operations in the adjacent 1990-2110 MHz band, we note that the current PCS rules provide for strict out-of-band emission limits.[297] We believe that these limits are sufficient to protect microwave operations in adjacent bands and, therefore, will not adopt any additional coordination or protection requirements for PCS operations.

192. We disagree with UTC that PCS licensees should be required to submit separate applications and obtain separate authorizations for each transmitter in their system. The information that would be submitted on these applications is unnecessary to the Commission, and its filing would be overly burdensome for PCS licensees. We believe that UTC's concerns are adequately addressed through our requirements for coordination.

193. Finally, we deny API's request for a rule automatically imposing penalties on PCS operations that interfere with fixed microwave users. We believe that such penalties are unnecessary and inappropriate. As we stated in the Second Report and Order, a principal concern in the authorization of PCS in the 2 GHz band is that existing fixed microwave operations be protected.[298] If interference were to occur, we would expect the PCS licensee to take appropriate action to resolve that interference. In cases where the PCS licensee did not take appropriate action, we believe our current remedies, either forfeitures or revocation of licenses, are sufficient.

D. PCS-to-PCS Interference Standards

194. In the Second Report and Order, the Commission established a limit for spurious emissions appearing outside of the spectrum allocated to PCS.[299] No limit was specified for spurious emissions appearing within the PCS spectrum. The Commission also adopted minimal standards for PCS transmitter frequency stability, stating only that the stability must

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[297] See Section 24.234 of the Commission's Rules.

[298] See Second Report and Order at ¶ 141.

[299] Spurious emission is defined as an emission on a frequency or frequencies which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products, but exclude out-of-band emissions. See 47 C.F.R. § 2.1. See also Section 24.234 of the Commission's Rules.